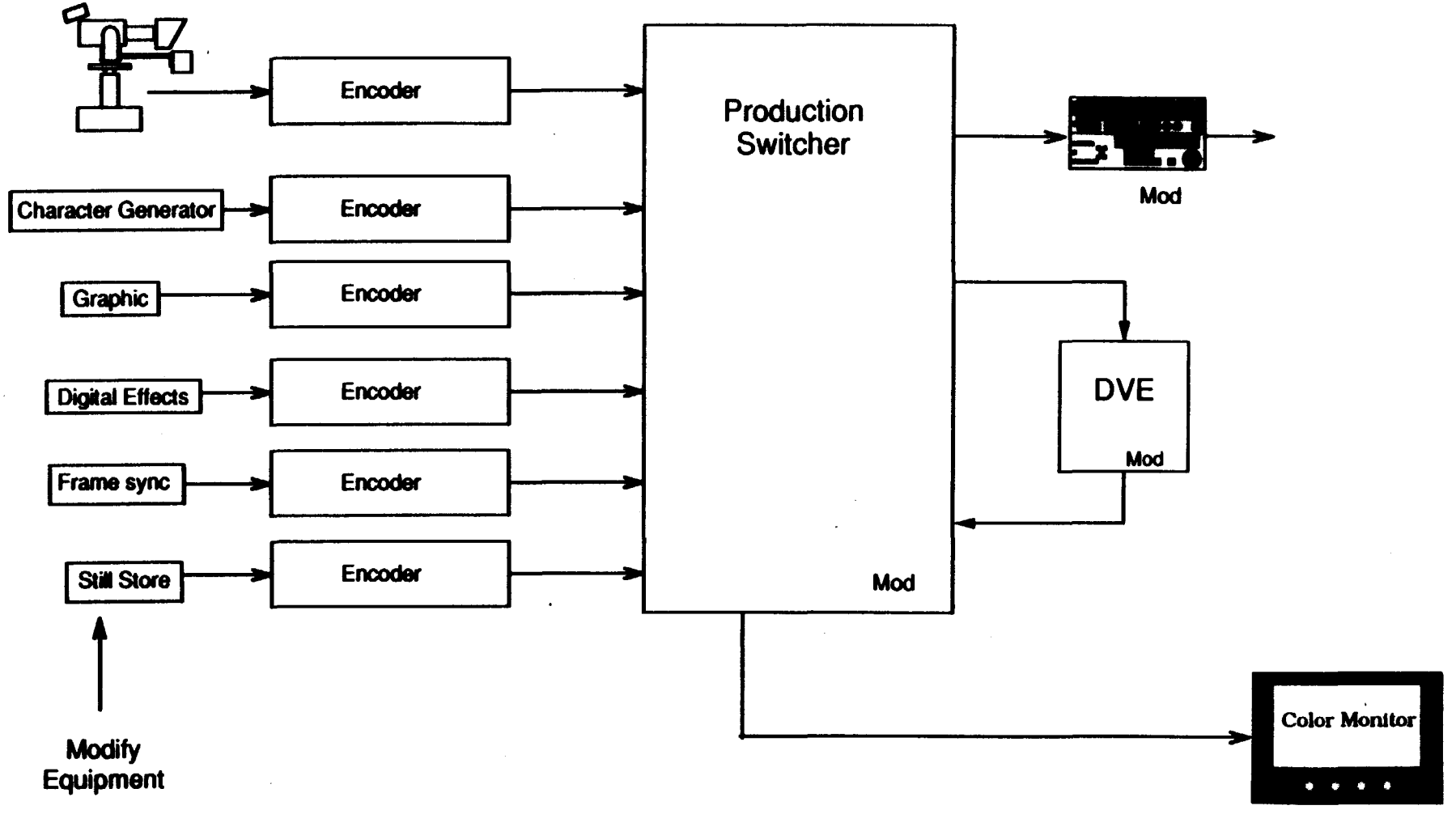
# Studio Production
# Using Widescreen NTSC

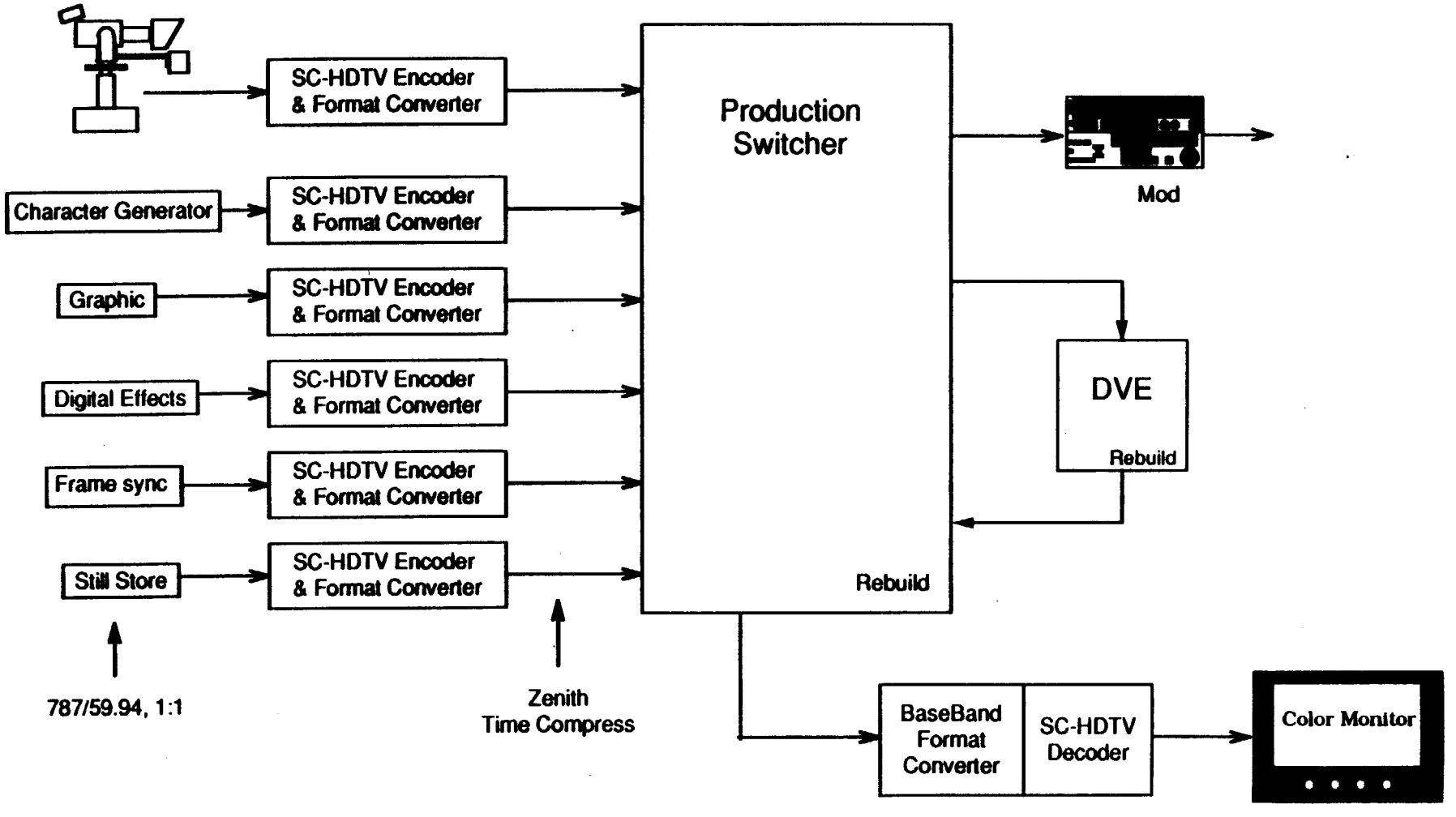



ACTV

WP-3
SG-1

FIGURE 5

# Studio Production
# Using Zenith Time Compression Format




Zenith II

WP-3
SG-1

FIGURE 6

## APPENDIX II

## WORKING PARTY 3 BLOCK DIAGRAMS FOR ATV NETWORK TERRESTRIAL BROADCASTING

Generic block diagrams are shown here that reflect the major elements that constitute a network operation.

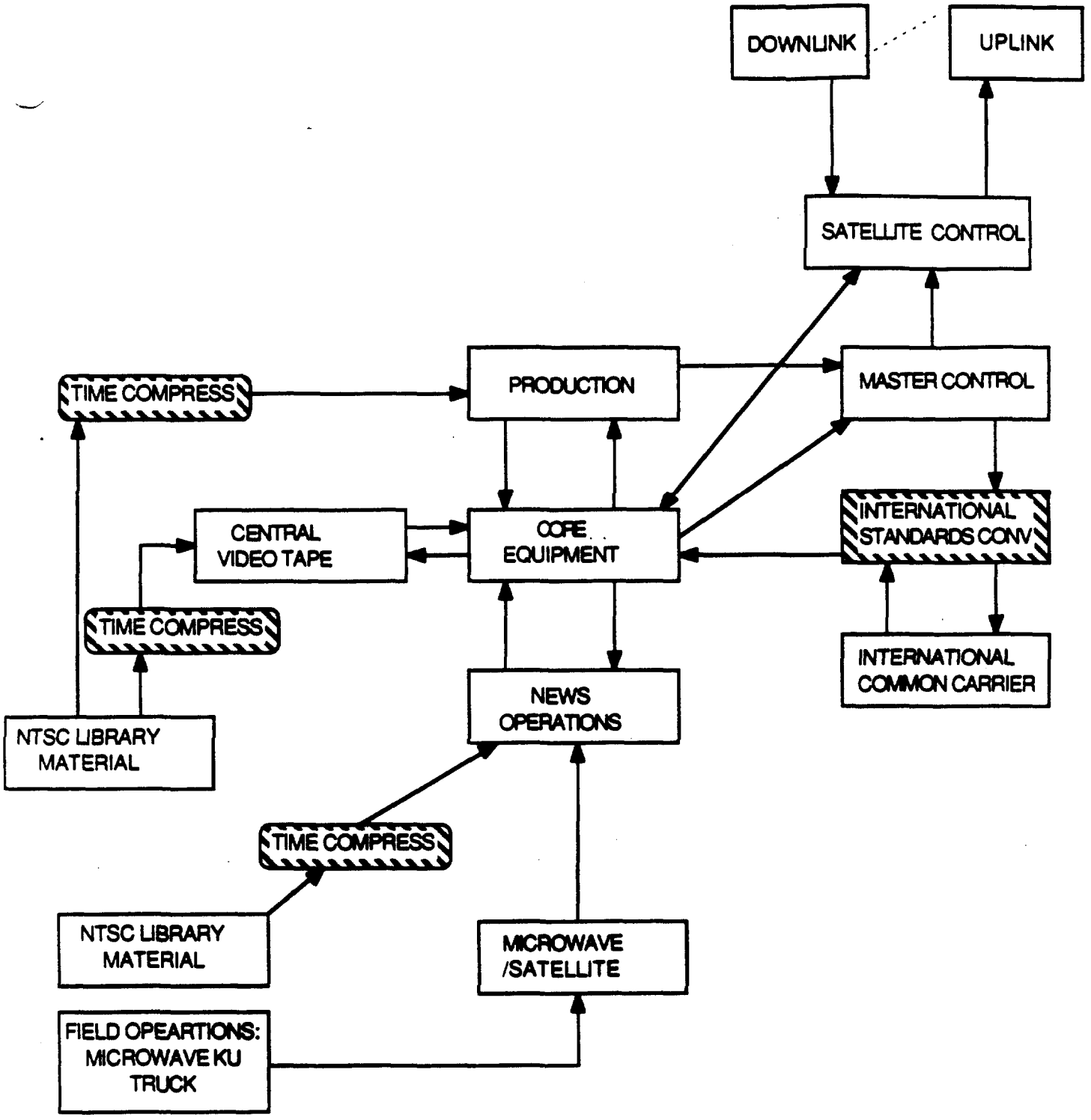
**Figure 1** shows a network implemented for the **ACTV** system of ATRC.

**Figure 2** shows the same network implemented for the **Zenith #1** system (baseband 787.5/59.94/1:1 origination and intra-plant distribution).

**Figure 3** shows the network implemented with the alternative **Zenith #2** system (encoded version of this signal intra-plant distribution).

**Figure 4** shows the network implemented for the **NHK Narrow Muse** transmission system (baseband 1125/60/2:1 production format for intra-plant origination and distribution).

FIGURE 1

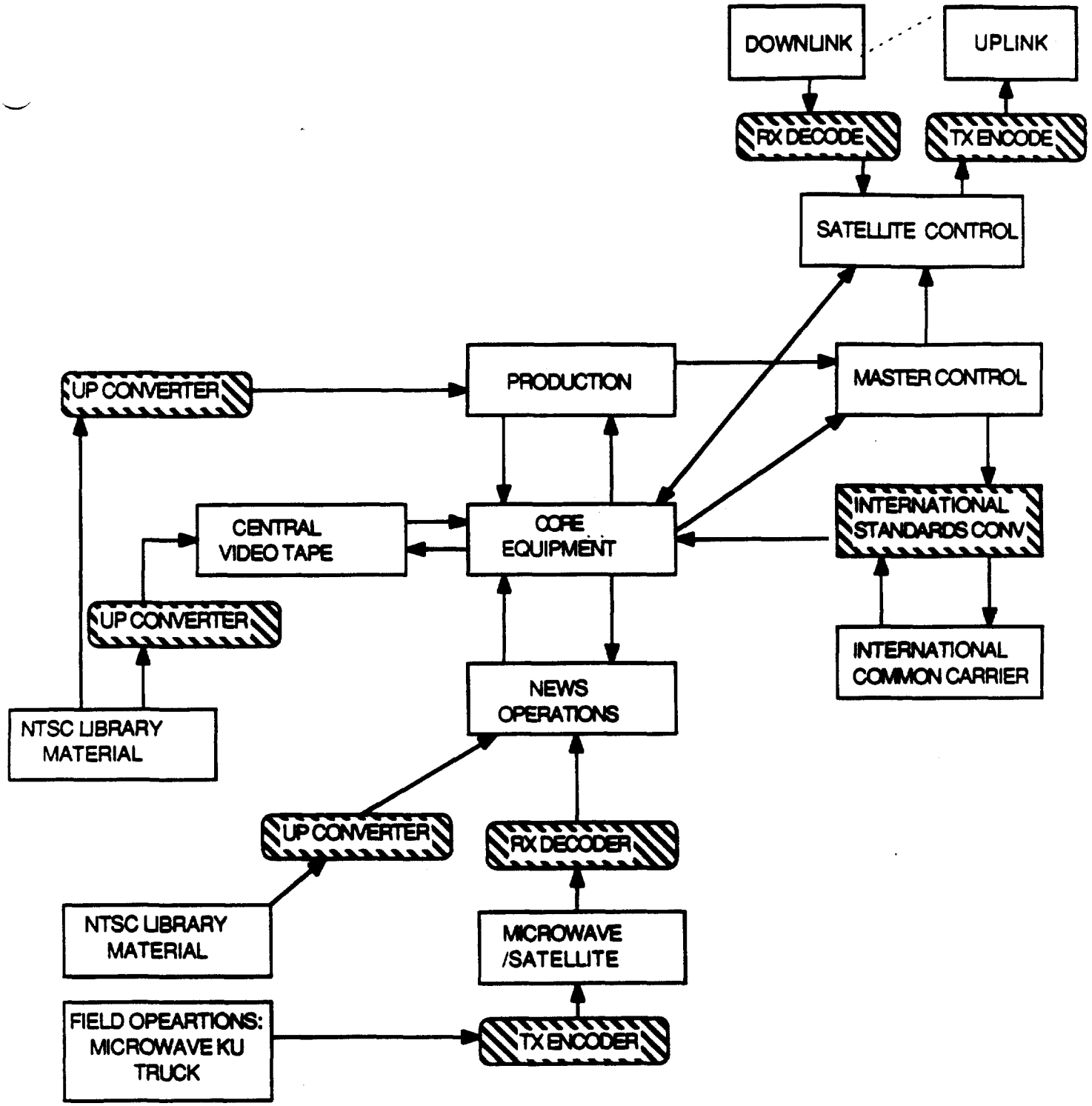



# Network ACTV

SM WEISS 04/24/90

ASSUMPTIONS:
1.PLANT IS 525 Widescreen/59.94/2:1

FIGURE 2

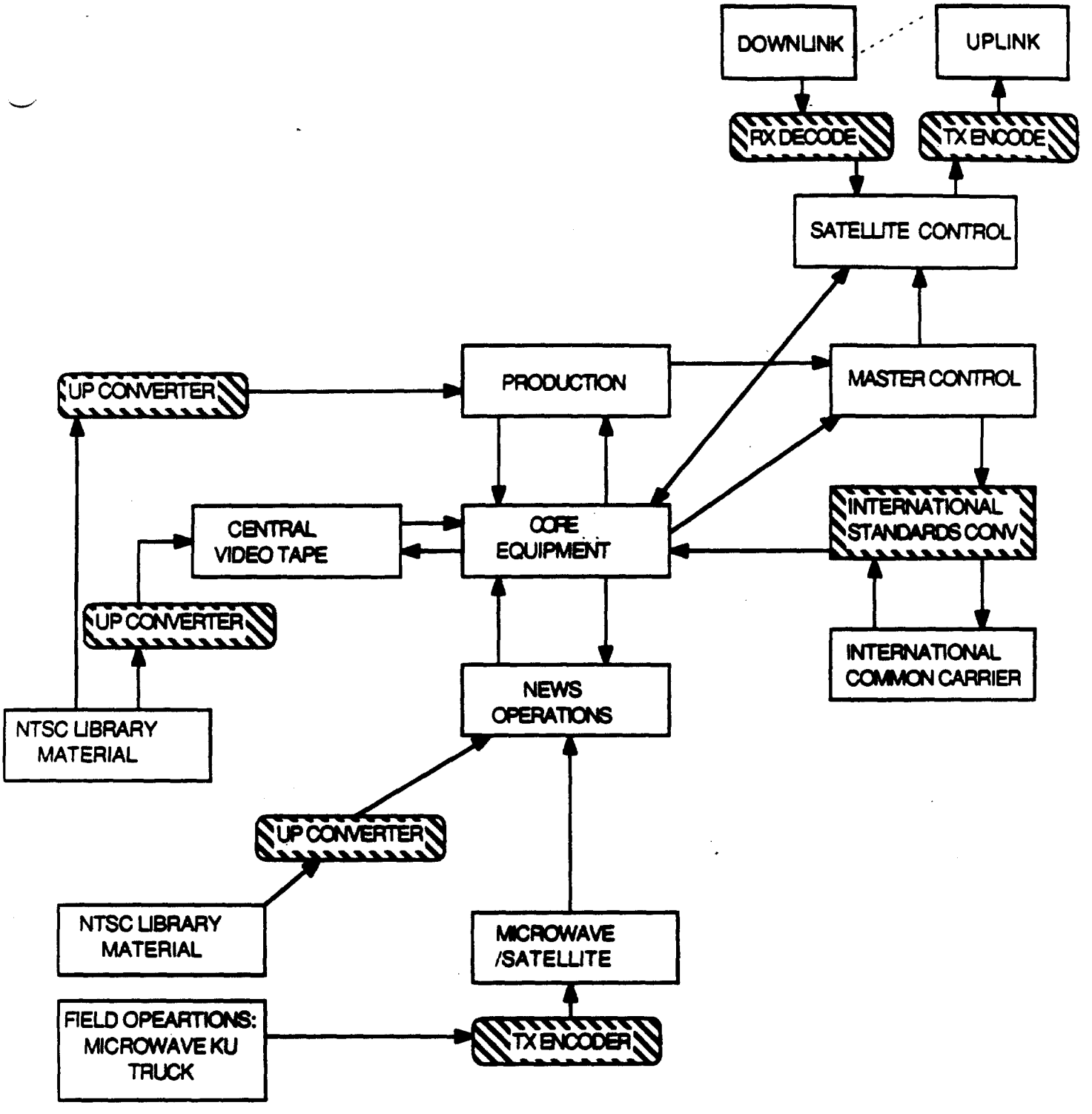



# Network Zenith #1

SM WEISS 04/24/90

ASSUMPTIONS:
1.PLANT IS 787.5/59.94/1:1

FIGURE 3



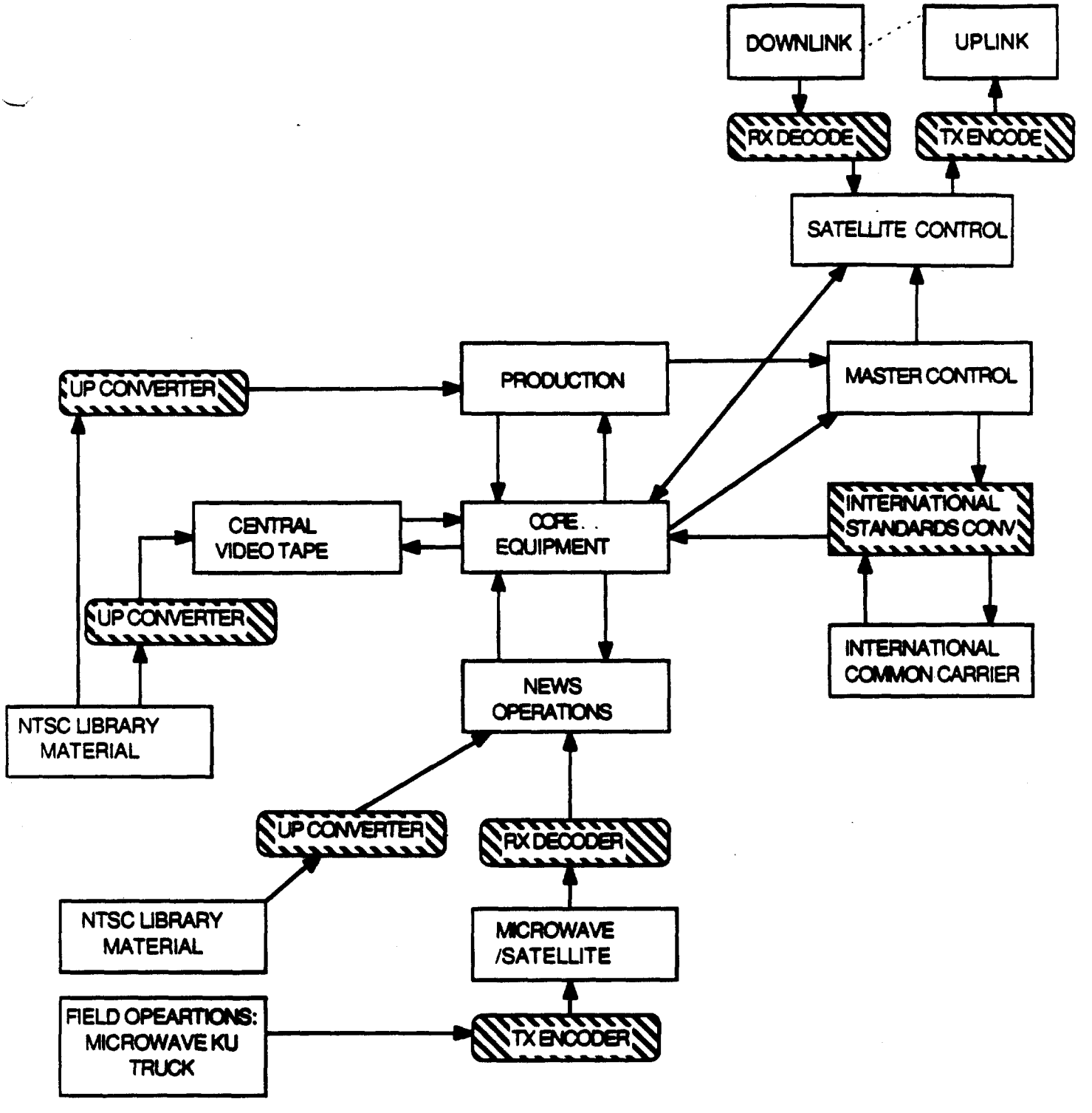

# Network Zenith #2

SM WEISS 04/24/90

ASSUMPTIONS:

1. PLANT IS ZENITH TIME-COMPRESSED BASEBAND

FIGURE 4




# Network NHK

SM WEISS 04/24/90

ASSUMPTIONS:

1. PLANT IS 1125/60/2:1

# APPENDIX III

## EXCERPT FROM PBS
## PRELIMINARY HDTV ESTIMATES

## (MEMBERS/PBS TRANSITION PLANNING)

**Note:**

Only an **excerpt** of this PBS submission to SS WP-3 - highlighting their transition phases (with associated system block diagrams) - is included in this report. Details of financial models and assumptions are still under intense discussion within WP-3 and it would therefore be premature to publish these at this stage of our studies.

SS WP-3-0110

# HIGH DEFINITION TELEVISION

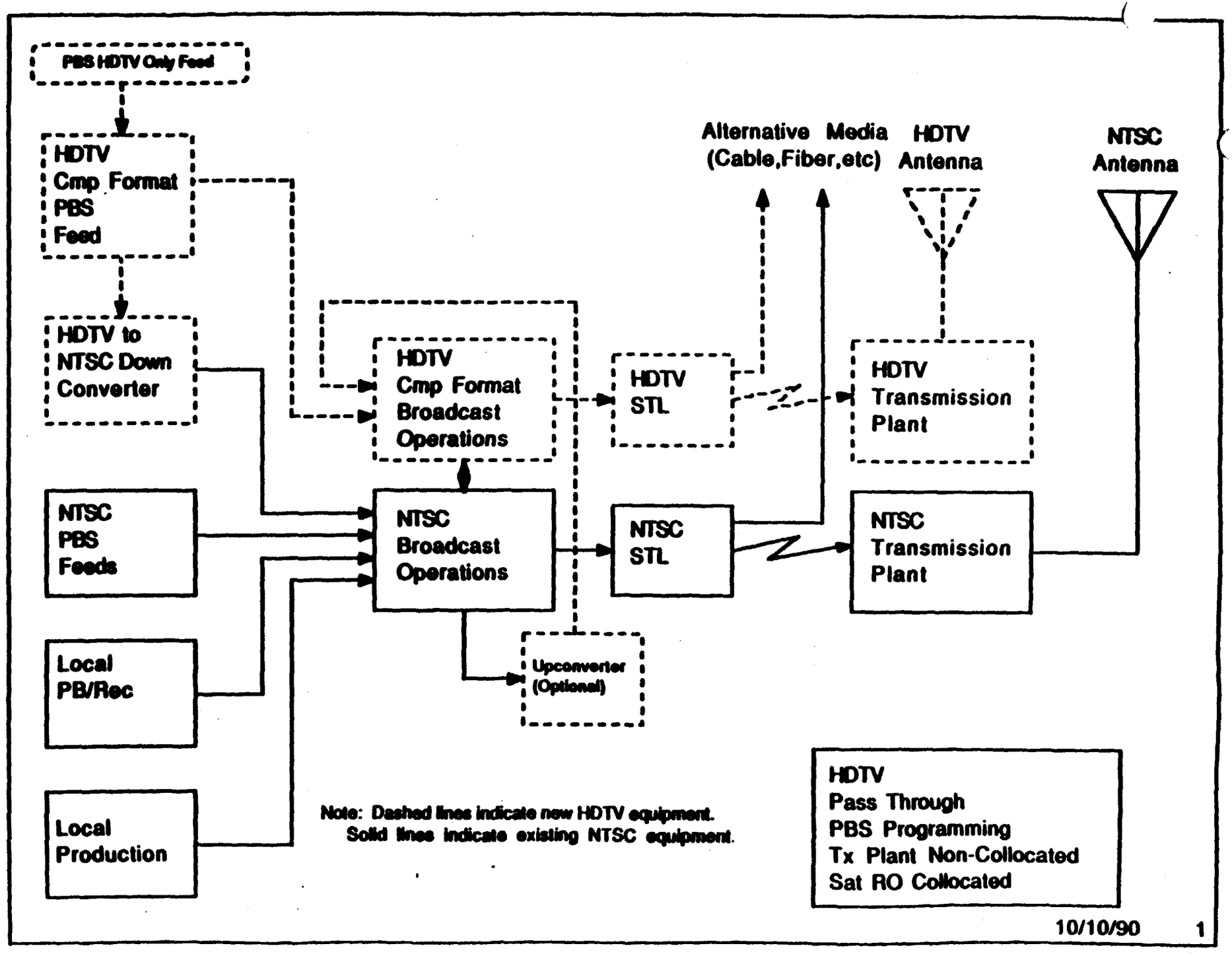
**Member/PBS Transition Planning**

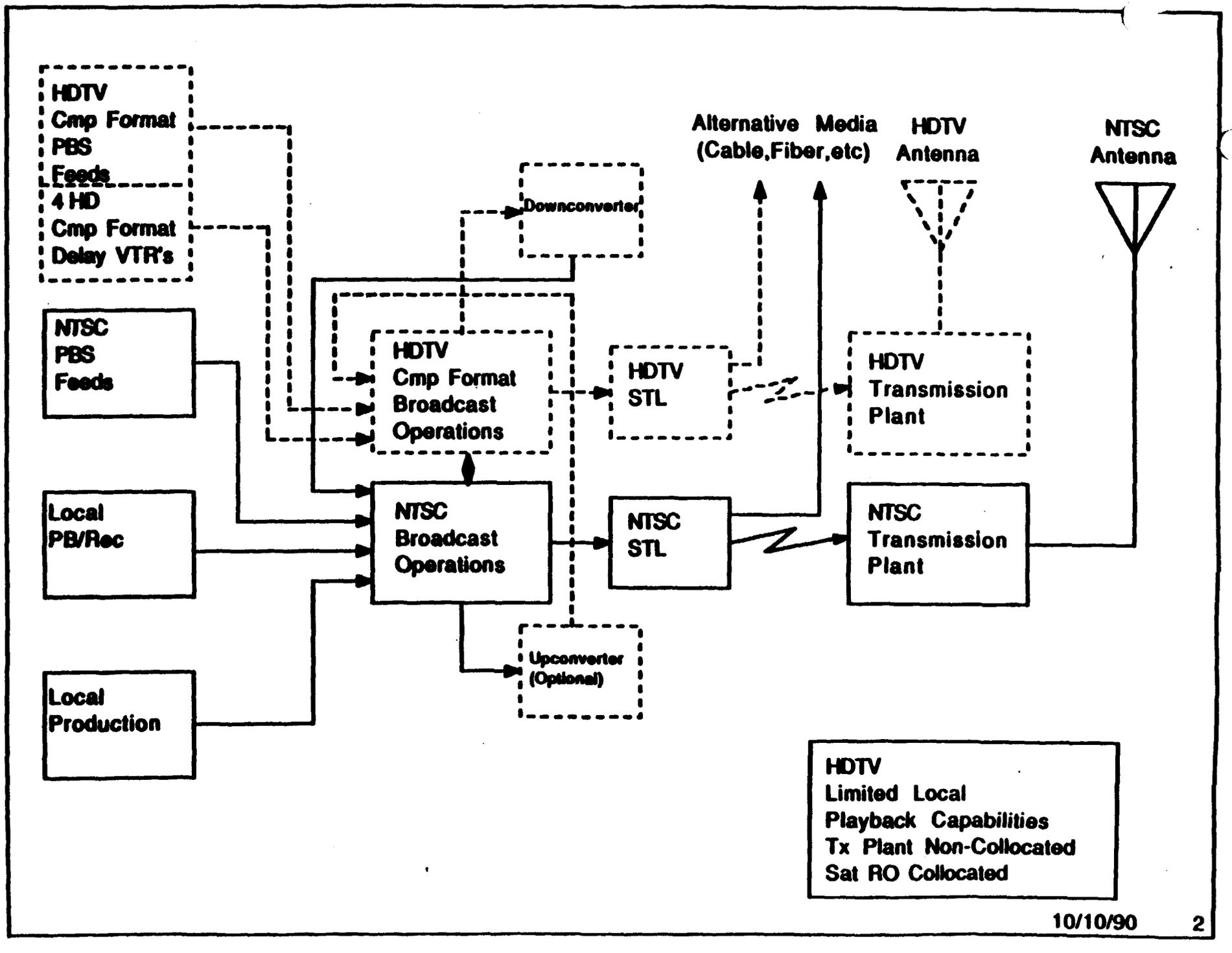
## Introduction

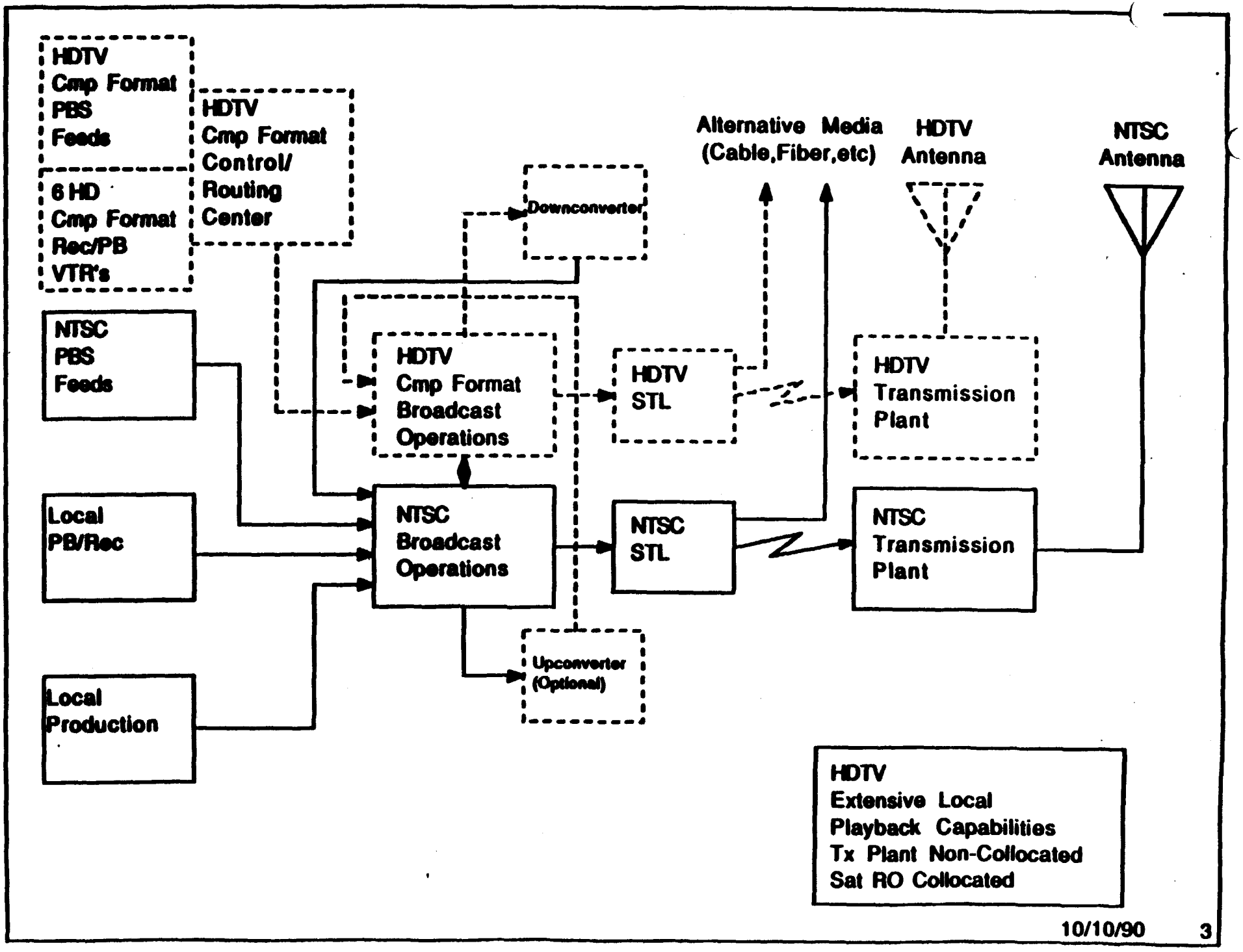
Each television station in America has a different station configuration and is in a unique competitive situation. Each station will have to examine its own situation in light of the many factors in order to decide what role it wants to play in the area of Advanced Television.

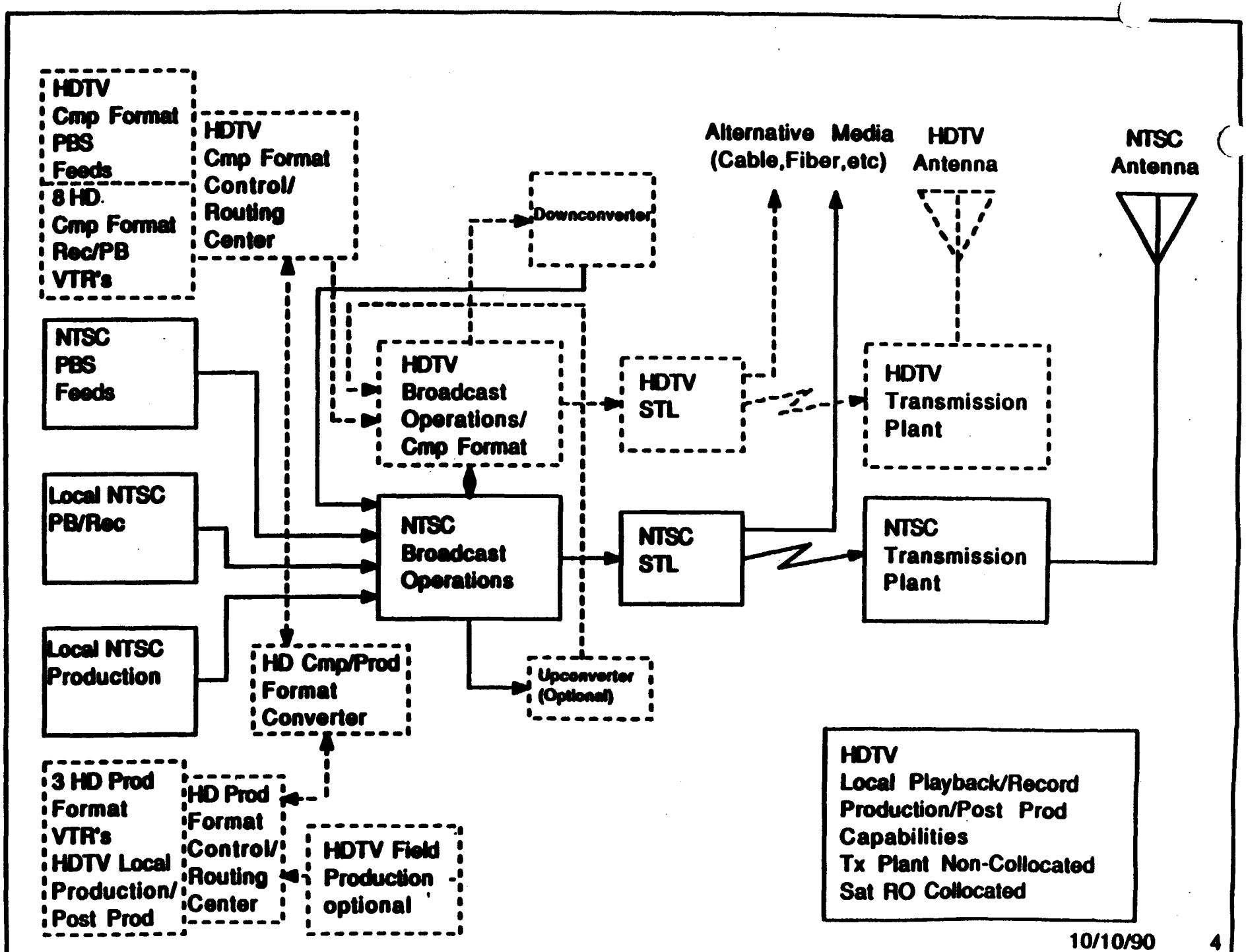
This document attempts to present some rudimentary and preliminary cost factors that will help stations to estimate the expense to add an ATV simulcast system. This is intended to be a shopping list with some basic groupings so that station general, financial, production and engineering managers can begin to develop long range strategies which would allow a manageable and graceful transition into ATV.

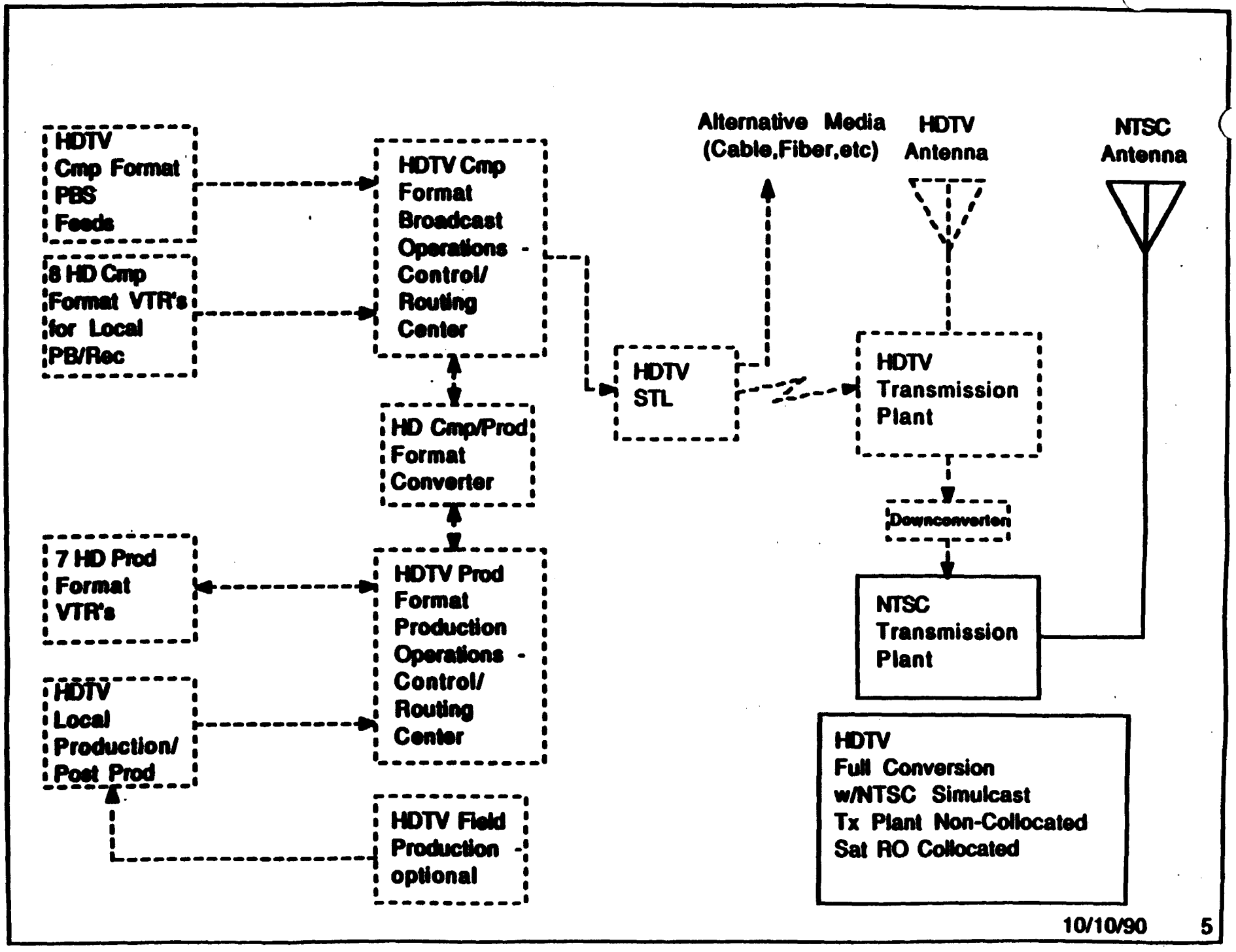
Much has been made in recent times about the high costs of advanced television. What has not been discussed is that these investments can be made over a many year period. Also not stated is that many of the high costs can be attributed to high research and development costs that must necessarily be absorbed through initial product sales. As time goes on, the technology of manufacturing and the equipment itself will improve and the costs will go down. Finally, costs generally refer to wide bandwidth major studio production equipment. As ATV develops, new more limited bandwidth equipment will need to be developed for local broadcast stations so that it can be produced at a lower cost. A few items of such equipment are already beginning to appear at HDTV trade shows. Others are now being discussed by equipment manufacturers and PBS is urging these manufacturers to complete the development of such products.


PBS HDTV Only Feed
HDTV Cmp Format PBS Feed
HDTV to NTSC Down Converter
HDTV Cmp Format Broadcast Operations
HDTV STL
Alternative Media (Cable,Fiber,etc)
HDTV Antenna
NTSC Antenna
HDTV Transmission Plant
NTSC PBS Feeds
NTSC Broadcast Operations
NTSC STL
NTSC Transmission Plant
Local PB/Rec
Upconverter (Optional)
Local Production
Note: Dashed lines indicate new HDTV equipment.
Solid lines indicate existing NTSC equipment.
HDTV
Pass Through
PBS Programming
Tx Plant Non-Collocated
Sat RO Collocated
10/10/90
1


HDTV
Cmp Format
PBS
Feeds
4 HD
Cmp Format
Delay VTR's
NTSC
PBS
Feeds
Local
PB/Rec
Local
Production
Downconverter
HDTV
Cmp Format
Broadcast
Operations
NTSC
Broadcast
Operations
Upconverter
(Optional)
HDTV
STL
NTSC
STL
Alternative Media
(Cable,Fiber,etc)
HDTV
Antenna
NTSC
Antenna
HDTV
Transmission
Plant
NTSC
Transmission
Plant
HDTV
Limited Local
Playback Capabilities
Tx Plant Non-Collocated
Sat RO Collocated
10/10/90
2


HDTV
Cmp Format
PBS
Feeds
6 HD
Cmp Format
Rec/PB
VTR's
HDTV
Cmp Format
Control/
Routing
Center
Downconverter
Alternative Media
(Cable,Fiber,etc)
HDTV
Antenna
NTSC
Antenna
NTSC
PBS
Feeds
HDTV
Cmp Format
Broadcast
Operations
HDTV
STL
HDTV
Transmission
Plant
Local
PB/Rec
NTSC
Broadcast
Operations
NTSC
STL
NTSC
Transmission
Plant
Local
Production
Upconverter
(Optional)
HDTV
Extensive Local
Playback Capabilities
Tx Plant Non-Collocated
Sat RO Collocated
10/10/90
3


HDTV
Cmp Format
PBS
Feeds
8 HD
Cmp Format
Rec/PB
VTR's
HDTV
Cmp Format
Control/
Routing
Center
Downconverter
Alternative Media
(Cable,Fiber,etc)
HDTV
Antenna
NTSC
Antenna
NTSC
PBS
Feeds
HDTV
Broadcast
Operations/
Cmp Format
HDTV
STL
HDTV
Transmission
Plant
Local NTSC
PB/Rec
NTSC
Broadcast
Operations
NTSC
STL
NTSC
Transmission
Plant
Local NTSC
Production
HD Cmp/Prod
Format
Converter
Upconverter
(Optional)
3 HD Prod
Format
VTR's
HDTV Local
Production/
Post Prod
HD Prod
Format
Control/
Routing
Center
HDTV Field
Production
optional
HDTV
Local Playback/Record
Production/Post Prod
Capabilities
Tx Plant Non-Collocated
Sat RO Collocated
10/10/90
4


HDTV Cmp Format PBS Feeds
8 HD Cmp Format VTR's for Local PB/Rec
HDTV Cmp Format Broadcast Operations - Control/ Routing Center
HD Cmp/Prod Format Converter
7 HD Prod Format VTR's
HDTV Prod Format Production Operations - Control/ Routing Center
HDTV Local Production/ Post Prod
HDTV Field Production - optional
HDTV STL
Alternative Media (Cable,Fiber,etc)
HDTV Antenna
NTSC Antenna
HDTV Transmission Plant
Downconverter
NTSC Transmission Plant
HDTV Full Conversion w/NTSC Simulcast Tx Plant Non-Collocated Sat RO Collocated
10/10/90
5

# APPENDIX IV

## EXCERPT FROM CBS
## HDTV
## TRANSITION SCENARIO FOR TV STATIONS

**Note:**

Only an **excerpt** of this CBS submission to SS WP-3 - highlighting the basic assumptions and the modeled transition scenarios for TV stations - is included in this report. Details of financial models and assumptions are still under intense discussion within WP-3 and it would therefore be premature to publish these at this stage of our studies.

SSWP-3-0111



# HIGH DEFINITION TELEVISION

# TRANSITION SCENARIO FOR TV STATIONS

## A CBS WORK-IN-PROGRESS

October 23, 1990

**Preliminary Results**

## 2. PREMISES AND ASSUMPTIONS

A number of important working premises and financial assumptions have been made in developing transition scenarios. These are outlined in Figure 1, listed below, and discussed in more detail later.

(i) Stations in the larger markets will be the first to make the transition to HD, not unlike the introduction of color television.

(ii) The transition will be conducted in phases, with each phase adding to the HD service provided by a station. Stations in larger markets will complete the transition in a shorter time than smaller market stations who may thus spread the capital investment program over a longer period. This again is similar to the introduction of color.

(iii) The labor cost of transition is 20% of the investment in capital equipment.

(iv) The transmission system selected will be all-digital and thus will require a much lower Effective Radiated Power (ERP) than current NTSC systems to reach the same audience. With a resulting, relatively small, HD transmitting antenna, the existing tower can be used.

(v) The initial prices for equipment are based on developmental and prototype units. For the period considered, with each doubling of the number of units manufactured, the cost will fall by 10% of the initial cost.

(vi) Existing plant, studio, and control room audio equipment will be reused, not replaced. It is further assumed that a station has previously converted to stereo.

3. PHASED IMPLEMENTATION

The introduction of a HDTV transmission service at a TV station will be a gradual process and will be implemented in phases. Each phase provides an incremental capability, and builds upon the preceding phases. (Figure 2) The number of phases, and the nature of the capabilty added in each phase, may vary from market-to-market or from station-to-station. Here is one, six-phase scenario:

Phase A: Network Pass-through

This is the minimum conversion necessary to deliver network supplied HDTV programming to a market. An additional transmitter and antenna will need to be purchased and installed, together with an additional studio-transmitter link, using microwave or fiber optics. Additional satellite earth station equipment for the reception of network programs, and some distribution, test, and monitoring equipment will be required. The only local origination is the insertion of station identification announcements.

Phase B: Local Commercials

In phase B, additional equipment will be added by the station to allow for local commercial inserts within the network programs.

Phase C: Local Videotape Programming

Video tape equipment will next be added to allow for playback of non-network (syndicated) programming when the network is not supplying HDTV programs.

Phase D: Local Studio Origination

A local station in this phase becomes an HDTV production facility. Phase D will add equipment to allow local production to be staged, recorded, edited, and broadcast.

Phase E: Final Plant Conversion

The entire plant systems are next upgraded, giving the station full HDTV capability. All production and origination, except for news gathering, is in HDTV. At this stage when the network transmits a program only in HDTV, the local station will down-convert the signal for the NTSC simulcast.

Phase F: Electronic News Gathering

This phase requires the conversion of the Electronic News Gathering (ENG) equipment to HDTV. At this point all local production is effected in HDTV, and the HDTV signal will be down-converted for NTSC simulcast.

## 4. TRANSITION SCENARIO

The six phases of conversion identified above are designed to provide an incremental capability with the completion of each phase. The block diagram in Figure 3 presents the completely converted station, with each phase outlined.

Phase A: - Network Pass-through

Shows the acquisition of an earth station receiving a satellite signal. The signal is decoded and routed to a switcher.

In this first phase, the switcher need only be of relatively simple design, to be expanded in later phases.

A station ID is inserted at this point. The signal is then encoded and fed through the STL to the transmitter and antenna.

Phase B: - Local Commercial Insertion

Two VTRs for the playback of HD commercials are added, feeding an automation switcher. When only NTSC commercials are available, an up-converter may be installed, increasing the 525 lines of NTSC.

Phase C: - Local Playback of Non-Network Programs

Requires the addition of program VTR's and a routing switcher.

Phase D: - Local Origination

Requires the addition of studio cameras, VTRs, and a production switcher.

Phase E: - Final Plant Conversion

Calls for the addition of a down-converter in order to feed HD programs to the NTSC transmitter for simulcast operations. An HD cart machine for the playback of commercials is added in this phase, together with test and monitoring facilities.

Phase F: - ENG

Requires the addition of HD camcorders, VCRs, and editing facilities. Existing microwave links will be used.

# HD STATION CONVERSION BLOCK DIAGRAM

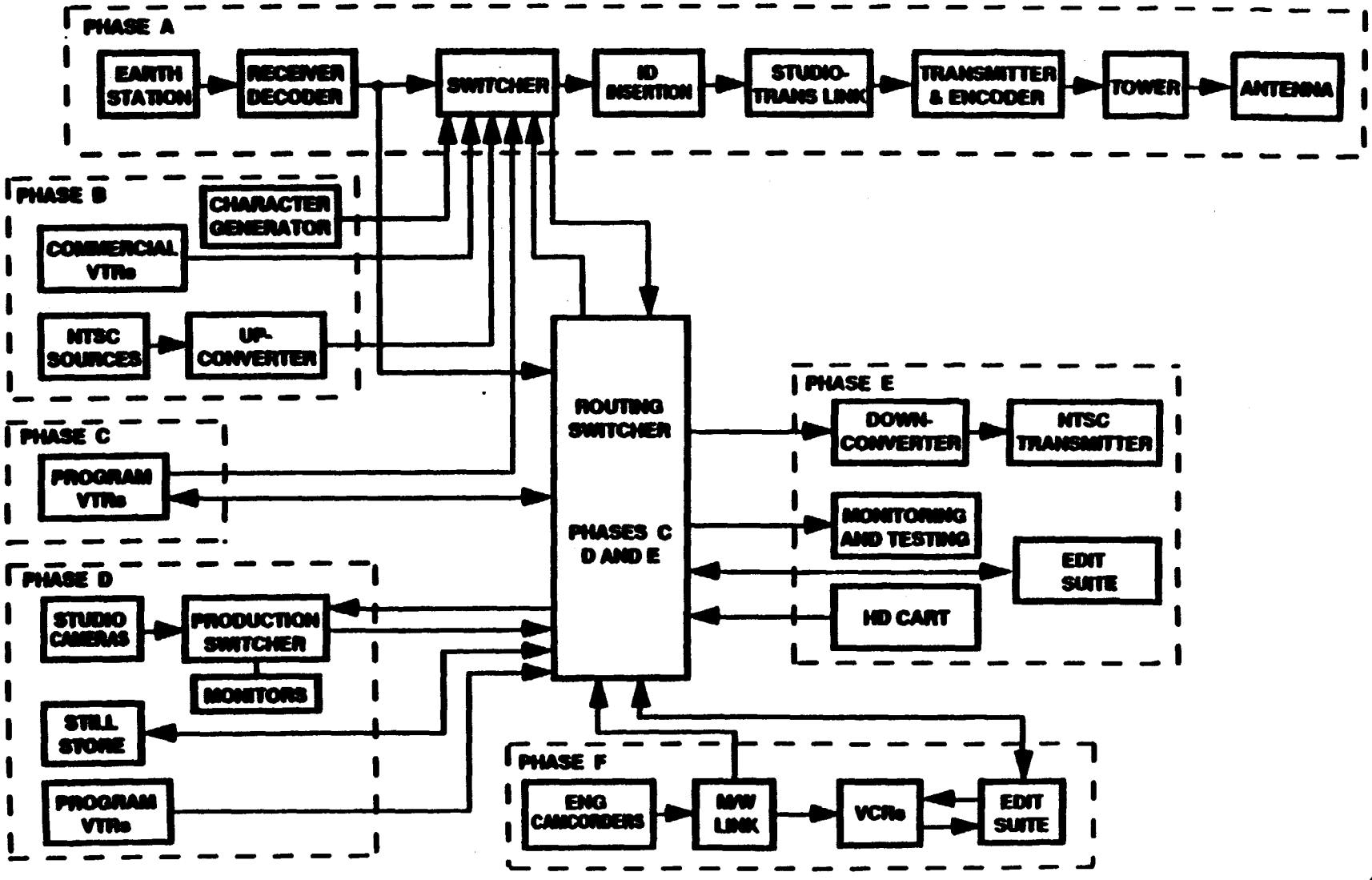



FIGURE 3

# HDTV TRANSITION SCHEDULE

| START YEAR | GROUP NO. | STATIONS EQUIPPED | MARKET RANKINGS SERVED | TV HOUSEHOLDS SERVED (MILLIONS) | PERCENT TVHH SERVED |
|---|---|---|---|---|---|
| 1 | 1 | 30 | 1-10 | 28 | 31 |
| 2 | 2 | +40=70 | 1-30 | 48 | 53 |
| 3 | 3 | +80=150 | 1-100 | 76 | 83 |
| 4 | 4 | +160=310 | 1-150 | 84 | 95 |
| 5 | 5 | +320=630 | ALL | 88 | 98 |
| 6 | 6 | +640=1270 | ALL | 90 | 100 |

FIGURE 11

# HD CONVERSION SCHEDULE BY PHASES FOR EACH GROUP OF STATIONS

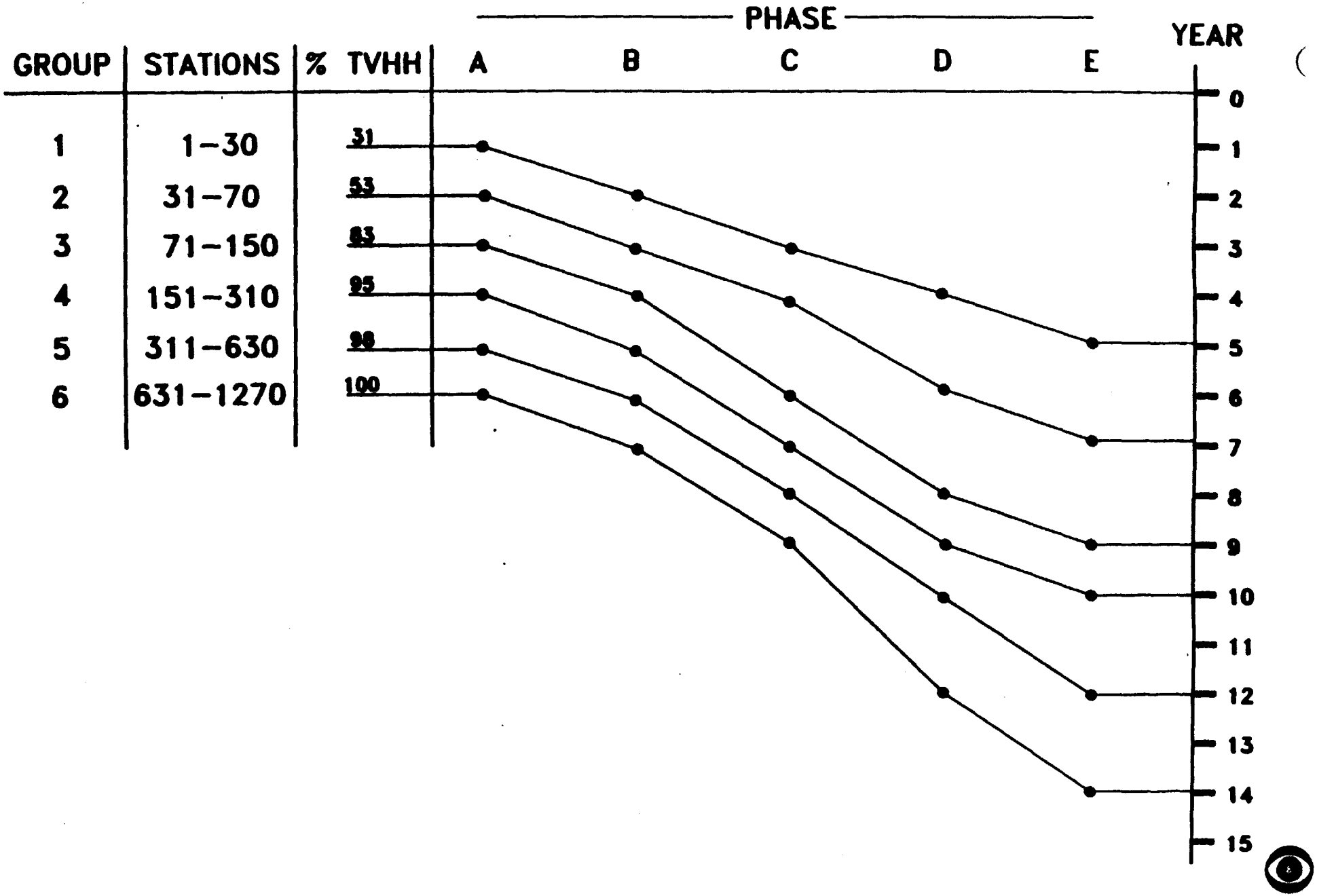



FIGURE 12